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GUIDELINES FOR ENGINEERING GEOLOGIC REPORTS

GENERAL INFORMATION

These guidelines suggest a format for reports. They do not include complete listings of techniques or topics, nor should all techniques described be used or all topics listed be dealt with in every project.

These guidelines are informational and are not regulations. Language used has been carefully gleaned of mandatory requirements. The guidelines have no force of law and do not set standards of practice. To be enforceable, the guidelines would have to be adopted as regulations in accordance with the Administrative Procedures Act.

On January 23, 1986, the Board of Registration for Geologists and Geophysicists (Board) passed the following resolution:

"The Guidelines have been adopted as useful information documents. Not having been adopted as regulations in accordance with the Administrative Procedures Act, the Guidelines are not legally enforceable."

These guidelines have their roots in eight California Division of Mines and Geology notes, that were published in California Geology during 1973-75. The four guidelines that evolved through the Technical Advisory Committee for the Board of Registration from 1983 to 1989 are:

Guidelines for Engineering Geologic Reports.
Geologic Guidelines for Earthquake and/or Fault Hazard Reports.
Guidelines for Geophysical Reports.
Guidelines for Groundwater Investigation Reports.

I. INTRODUCTION

These guidelines have been prepared by the Technical Advisory Committee of the Board and adopted by the Board on April 18, 1998 to assist those involved in preparing or reviewing engineering geologic reports. The guidelines present general procedures suggested for use by geologists carrying out engineering geologic studies and, while they do not constitute a complete listing of all techniques for such studies, they do include most major topics. In the broad sense, nearly all engineering projects requiring geologic input are also engineering geology projects. Most of these involve identifying and evaluating geologic hazards, using the various exploration tools available today, as applicable, and developing appropriate mitigation measures, if necessary. Projects may include on-land and offshore structures, large excavations, buried tanks and disposal sites for hazardous, designated and nonhazardous wastes. Groundwater and its

relationship to other site characteristics is an integral part of engineering geology. Additionally, past uses of a site are becoming increasingly important in evaluating its applicability for a new use.

Engineering geology reports would be expected to be prepared by or under the direct supervision of a certified engineering geologist. Clear descriptions of work and unambiguous presentations of results are encouraged. If the report falls within the scope of the Geologist and Geophysicist Act (Business and Professions Code, Chapter 12.5), it must be signed by the responsible professional(s). If such reports include significant geophysical information, they should be cosigned by a registered geophysicist, or the signed geophysical report may be appended to the geological report. It is important that reports that present conclusions or recommendations based in part on field sampling or field or laboratory testing include the test results with adequate descriptions of the methods employed, and with specific reference to standard sampling, preservation, and testing methods, where appropriate. Where necessary, technical terms will need to be defined.

The following is a suggested guide or format for engineering geologic reports. These reports may be prepared for projects ranging in size from a single lot to the master plan for large acreage, in scope from a single family residence to large engineering structures and for sites in all manner of geologic terrain. Because of this diversity, the order, format and scope of the reports is flexible to allow tailoring to the geologic conditions and intended use of the site. The format is intended to be relatively complete; not all items will be applicable to small projects or low-risk sites. In addition, some items may be covered in separate reports by geotechnical engineers, geophysicists, or structural engineers.

II. REPORT CONTENT

A. Purpose and Scope of the Investigation

Includes a brief description of proposed or existing site use; may also include a description of limitations of the work and authorization to perform the work. The design lifespan of the proposed project should be implicitly stated.

B. Regional Geologic Setting

May include reference to geologic province and location with respect to major structural features.

C. Site Description and Conditions

Includes information on geologic units, landforms, graded and filled areas, vegetation, existing structures, etc., that may affect the choice of investigative methods and the interpretation of data.

D. Description of the Investigation

1. Review of the regional and site geology, and land-use history, based primarily on existing maps and technical literature.

a. Geologic hazards that could affect the planned use of the site.

(1) Significant historic earthquakes in the region.

(2) Fault traces that may affect the site. Is the site within an earthquake fault zone?

(3) Secondary earthquake effects, such as ground breakage in the vicinity of the site, seismically-induced landslides, differential tilting and liquefaction.

(4) Regional effects, such as subsidence, uplift, etc.

(5) Landslides or other earth movements at the site and vicinity.

(6) Soil and rock properties such as high moisture content, low density, swelling, cementation, weathering, fracturing, etc.

b. Other geologic conditions that could affect the planned use of the site.

(1) Soil thickness, types, and relationship to bedrock.

(2) Excavatability of rock materials.

(3) Depth to and characteristics of subsurface water.

c. Conditions imposed on the site by past uses, such as buried objects, contaminated soils, groundwater, or adjacent structures, etc.

2. Interpretation of aerial photographs and other remotely sensed images relative to topography, vegetation, or any other features related to geologic hazards and past site use.

3. Surface investigation.

a. Mapping of the site geology and vicinity; identification and description of geologic units, soil and rock types, and features that could be related to geologic hazards and the proposed use and constructability of the site. A clear distinction should be made on the map and within the report between observed and inferred geologic features and relationships.

b. Evaluation of surface-water conditions, including quality, flood potential in relation to site conditions, geomorphology and drainage within or affecting the subject area.

4. Subsurface investigation.

a. Trenching and any other excavation (with appropriate logging and documentation) to permit detailed and direct observation of continuously exposed geologic units and features.

b. Borings drilled, test pits excavated, and groundwater monitoring wells installed to permit the collection of data needed to evaluate the depth and types of materials and subsurface water. Data points sufficient in number and adequately spaced will permit valid correlations and interpretations.

c. Geophysical surveys conducted to facilitate the evaluation of the types of site materials and their physical properties, groundwater conditions and any other pertinent site conditions. The types of equipment and techniques used, such as seismic refraction, magnetic, electric resistivity, seismic reflection and gravity, and the name of the geophysicist responsible for the work.

5. Special methods (used when special conditions permit or critical structures demand a more intensive investigation).

a. Aerial reconnaissance overflights, including special photography.

b. Geodetic measurements, radiometric analysis, age dating, etc.

E. Results of Investigation

Describes the results of the investigation outlined in Section IV above. The actual data or processed data upon which interpretations are based should be included in the report to permit technical reviewers to make their own assessments regarding reliability and interpretation.

F. Conclusion

Relative to the intended land use or development (made in conjunction with the geotechnical engineering study). Includes a statement concerning the degree of confidence in and limitations of the data and conclusions, as well as disclosure of known or suspected potentially hazardous geologic processes affecting the project area.

1. Presence or absence of active or potentially active faulting at the site or in the vicinity, and the potential for renewed fault activity.

2. Effects on the site from ground shaking.

3. Potential for secondary effects from earthquakes, such as ground cracking, landsliding, and liquefaction.

4. Potential for subsidence or other regional effects.

5. The presence of creep or landsliding; and possible future mass movements.

6. Soil and rock conditions, such as swelling soils that could affect site use.

7. The presence of and possible effects from any other soil and rock defects.

8. Excavation methods.

9. Presence of contamination or any other man-imposed condition.

10. Potential for earthquake-induced flooding, including tsunamis and seiches.

11. Potential for volcanic hazards.

12. Conformance with local, state and federal statutory and regulatory requirements.

G. Recommendations

1. Effect of fault locations on proposed structures at the site. Federal, state, or local law may dictate minimum standards.

2. Placement of structures to best take advantage of geologic conditions.

3. Methodology for excavating and moving materials.

4. Means of correcting site defects, such as buttressing landslides, installing special drainage devices, etc.

5. Correcting contamination or other man-induced site defects.

6. Other recommendations as appropriate for the proposed project.

H. References

1. Literature and records cited and reviewed.

2. Aerial photographs or images interpreted, listing the type, scale, source, and index numbers, etc.

3. Compiled data, maps, or plates included or referenced.

4. Other sources of information, including well records, personal communications, or other data sources.

I. Illustrations

1. Location map to identify the site locality, geographic features, or major regional geologic features.

2. Site development map, at an appropriate scale, to show the site boundaries, existing and proposed structures, graded areas, streets, and locations of exploratory trenches, borings, wells, geophysical traverses, and other data.

3. Geologic map to show the areal distribution of geologic units, faults and other structures, geomorphic features, aerial photo features noted, along with surface water bodies and springs. The geologic map may be combined with the location and site development maps.

4. Geologic cross sections illustrating significant or appropriate geologic features.

5. Logs of exploratory trenches and borings to show the details of observed features and conditions.

6. Geophysical data and the geologic interpretations of those data.

7. Other, as appropriate.

J. Supporting Data Not Already Provided

1. Non-confidential water well data (including bore-hole logs).

K. Signature and Registration Number of the Responsible Professional(s)

1. Registered Geologist, Certified Engineering Geologist.

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(Rev. 7/98)